

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : KUBOTA CORP

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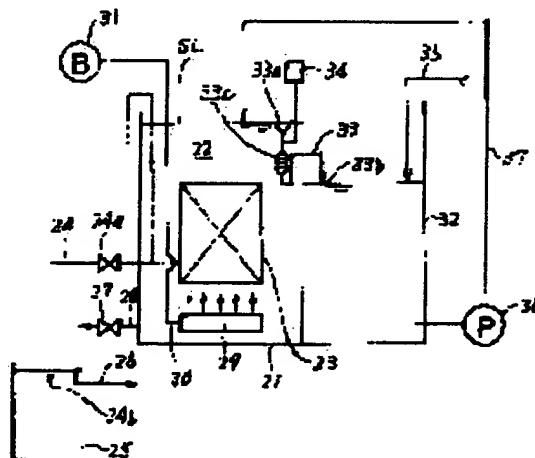
(72)Inventor : SOEDA YUJI  
IZUMI SEIJI  
MORO MASASHI

## (54) DIPPING TYPE FILTERING DEVICE

### (57)Abstract:

**PURPOSE:** To execute the solid-liquid separation of a water to be treated without adding a special power and to reduce running cost by applying a water head corresponding to the depth of water from a fixed water level to a film separation unit.

**CONSTITUTION:** The film separation unit 23 is dipped and arranged at an adequate depth of water in a film separation vessel 21. An over flow pipe 33 is provided so that a water collecting opening 33a opens at an adequate position above the film separation unit 23. A take-out pipe 24 is provided so that the bottom end side is communicated with a permeated solution passage of the film separation unit 23 and the tip end side opens at the position under the film separation unit 23 in the outside of the film separation vessel 21.



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**CLAIMS**

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**[Claim(s)]**

**[Claim 1]** The dipping former filter characterized by a head side forming fetch tubing which carries out opening to a lower part location from a membrane-separation intracisternal solution side in the exterior of a membrane-separation tub while the overflow pipe with which immersion arrangement is carried out at the bottom of suitable depth of water, and catchment opening carries out opening of the membrane-separation unit to an upper suitable location from a membrane-separation unit was formed in the membrane-separation tub into which processed water flows and the end face side was open for free passage to the transparency liquid flow channel of a membrane-separation unit.

**[Claim 2]** The dipping former filter according to claim 1 characterized by preparing catchment opening of an overflow pipe free [ rise and fall ] up and down.

**[Claim 3]** The dipping former filter according to claim 1 characterized by preparing a flow control valve in the head side of fetch tubing.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates solid liquid separation to a dipping former filter in a tub.

[0002]

[Description of the Prior Art] Conventionally, there is a thing as shown, for example in drawing 2 as a configuration using a filter in water treatment. In drawing 2, raw water, such as sewage and nightsoil, flows into a reaction vessel 1 through the raw water supply pipe 2, it mixes with the active sludge in a reaction vessel 1, and raw water forms mixed liquor 3. Moreover, air 5 is supplied to a diffuser 7 through an airpipe 6 by the blower 4, and aeration of the air 5 is carried out towards the upper part from a diffuser 7. It is made to circulate within a tub, while supplying oxygen into mixed liquor 3 by this aeration, carrying out stirring mixing of the mixed liquor 3 in a reaction vessel 1 by the lifting stirring style which occurs according to an airlift operation of air 5.

[0003] On the other hand, solid liquid separation of the mixed liquor 3 in a reaction vessel 1 is carried out with the membrane-separation unit 8, and the transparency liquid which penetrated the filtration membrane of the membrane-separation unit 8 is taken out to the treated water tub 12 through the siphon 11 with a suction pump 10 as treated water 9.

[0004]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional configuration, in order to carry out solid liquid separation of the mixed liquor 3 in a reaction vessel 1, it is necessary to give negative pressure to the membrane-separation unit 8 with a suction pump 10. Although this negative pressure is controlled according to the transparency flux (Flux flux) in the membrane-separation unit 8, since transparency flux fell when the cake layer was formed in the film surface, negative pressure needed to be raised and there was a problem to which the running cost accompanying actuation of a suction pump 10 becomes high.

[0005] It aims at offering the dipping former filter which can carry out solid liquid separation of the processed water in a tub, without [ without this invention solves the above-mentioned technical problem and it uses a suction pump, and ] needing power separately.

[0006]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the dipping former filter of this invention While the overflow pipe with which immersion arrangement is carried out at the bottom of suitable depth of water, and catchment opening carries out opening of the membrane-separation unit to an upper suitable location from a membrane-separation unit is formed in the membrane-separation tub into which processed water flows and a end face side is open for free passage to the transparency liquid flow channel of a membrane-separation unit A head side considers as the configuration which formed fetch tubing which carries out opening to a lower part location from a membrane-separation intracisternal solution side in the exterior of a membrane-separation tub.

[0007] Moreover, it considers as the configuration which prepared catchment opening of an overflow pipe free [ rise and fall ] up and down. Moreover, it considers as the configuration which prepared the flow control valve in the head side of fetch tubing.

[0008]

[Function] the above-mentioned configuration -- catchment opening of an overflow pipe -- an upper limit --

carrying out -- the inside of a membrane-separation tub -- processed water -- storing -- the water level in a membrane-separation tub -- the location of catchment opening -- setting out -- it maintains as water level. this condition -- setting -- a membrane-separation unit -- setting out -- since it \*\*\*\*s in depth of water from water level and water head pressure acts, solid liquid separation of the processed water in a membrane-separation tub is carried out for water head pressure as driving pressure force of a membrane-separation unit, and the transparency liquid which penetrated the filtration membrane of a membrane-separation unit is taken out to the exterior of a membrane-separation tub through fetch tubing. Therefore, solid liquid separation of processed water can be performed, without applying power from the exterior separately.

[0009] moreover, the thing for which it goes up and down catchment opening -- setting out in a membrane-separation tub -- the variation rate of the water level is carried out, the water head pressure applied to a membrane-separation unit is adjusted, and the transparency flux in a membrane-separation unit is controlled.

[0010] Moreover, by operating a flow control valve, the back pressure given into a membrane-separation unit is adjusted, and the transparency flux in a membrane-separation unit is controlled.

[0011]

[Example] Although one example which applied this invention to water treatment is hereafter explained based on a drawing, this invention is not restricted to water treatment and can be applied also to a catalyst or the solid liquid separation of an adsorbent.

[0012] In drawing 1, the mixed liquor of raw water, such as sewage coconut urine, and active sludge is stored in the interior of the membrane-separation tub 21 as processed water 22, and immersion arrangement of the membrane-separation unit 23 is carried out under the suitable depth of water of processed water 22. Two or more membrane modules which make tabular were set, and have been arranged to parallel in the vertical direction, and this membrane-separation unit 23 opened the suitable gap for free passage for them to the transparency liquid flow channel of each membrane module, and has formed the fetch tubing 24.

[0013] While this fetch tubing 24 is open for free passage to the transparency liquid flow channel of the membrane-separation unit 23 by the end face side, the head side is open for free passage to the exterior of the membrane-separation tub 21 through flow control valve 24a, and that head opening 24b is caudad located from the membrane-separation intracisternal solution side SL. Moreover, head opening 24b of the fetch tubing 24 is located in the treated water depot 25, and has formed the overflow pipe 26 which maintains the water level uniformly in the treated water depot 25. In addition, the fetch tubing 24 can also be formed in a siphon type as a two-dot chain line shows in drawing 1.

[0014] While the sludge drawn tube 28 which infixed the closing motion valve 27 carries out opening to the pars basilaris ossis occipitalis of the membrane-separation tub 21, it was located under the membrane-separation unit 23, the powder trachea 29 is arranged, and the blower 31 is connected to the powder trachea 29 through an airpipe 30. In addition, it is also possible to install the stirring equipment which replaced with the powder trachea 29 and had a mechanical stirring aerofoil.

[0015] The membrane-separation tub 21 is open for free passage through an overflow pipe 33 to the adjoining flow control tub 32, catchment opening 33a carries out opening of the overflow pipe 33 to an upper suitable location from the membrane-separation unit 23 in the membrane-separation tub 21, and exhaust port 33b is carrying out opening into the flow control tub 32. Moreover, in the middle of the overflow pipe 33, bellows section 33c is elastically prepared in the vertical direction, and the removed \*\* cylinder equipment 34 which comes out of up and down holds catchment opening 33a. In addition, an overflow pipe 33 can also be formed by the member which has the flexibility of a rubber hose etc.

[0016] The raw water supply pipe 35 carries out opening to the flow control tub 32 in the upper part, the circulation tubing 37 which infixed the circulating pump 36 in the pars basilaris ossis occipitalis is carrying out opening, and the head side is carrying out opening of the circulation tubing 37 within the membrane-separation tub 21.

[0017] Hereafter, the operation in the above-mentioned configuration is explained. The end reservoir of the raw water supplied from the raw water supply pipe 35 in the flow control tub 32 is carried out, and the membrane-separation tub 21 is supplied through the circulation tubing 37 with a circulating pump 36. returning surplus processed water 22 to the flow control tub 32 through an overflow pipe 33 in the membrane-separation tub 21 -- catchment opening 33a of an overflow pipe 33 -- an upper limit -- carrying out -- processed water 22 -- storing -- the water level in the membrane-separation tub 21 -- the location of

catchment opening 33a – setting out – it always maintains as water level.

[0018] On the other hand, air is supplied to the powder trachea 29 through an airpipe 30 by the blower 31, and aeration is carried out towards the upper part from the powder trachea 29. The processed water 22 in the membrane-separation tub 21 is stirred, and it is made to circulate within a tub by the lifting stirring style which occurs according to this airlift operation of air that carried out aeration.

[0019] In this condition, since the water head pressure by which at least setting-out water is equivalent to the difference of SL and fetch tubing head opening 24b acts on the membrane-separation unit 23, solid liquid separation of the processed water 22 in the membrane-separation tub 21 is carried out for water head pressure as driving pressure force of the membrane-separation unit 23. The transparency liquid which penetrated the filtration membrane of the membrane-separation unit 23 is stored in ejection and the treated water depot 25 to the exterior of the membrane-separation tub 21 through the fetch tubing 24. Moreover, by the above-mentioned lifting stirring style, the cake layer adhering to the film surface of the membrane-separation unit 23 is made to exfoliate from a film surface, and is again circulated within a tub.

[0020] and the thing made to go up and down catchment opening 33a with cylinder equipment 34 when [ , such as at the time of initialization and lack of the driving pressure force etc., ] adjusting the transparency flux in the membrane-separation unit 23 – setting out in the membrane-separation tub 21 – water level – the variation rate of the SL is carried out and the water head pressure applied to the membrane-separation unit 23 is controlled. Or by operating flow control valve 24a infixed in the fetch tubing 24, the back pressure given into the membrane-separation unit 23 is adjusted, and the transparency flux in the membrane-separation unit 23 is controlled.

[0021] Solid content, such as excess sludge which remains to the membrane-separation tub 21, operates the closing motion valve 27, and discharges it out of a tub through the sludge drawn tube 28.

[0022]

[Effect of the Invention] according to [ as stated above ] this invention – the processed water in a membrane-separation tub – setting out – water level -- maintaining – a membrane-separation unit – setting out – by making the water head pressure which \*\*\*\*s in depth of water from water level act, solid liquid separation of processed water can be performed without applying power separately from the outside, and reduction of the running cost concerning membrane-separation actuation can be aimed at. Moreover, the transparency flux in a membrane-separation unit is controllable by adjusting the back pressure which adjusts water head pressure by rise and fall of catchment opening, or is given into a membrane-separation unit by actuation of a flow control valve.

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**TECHNICAL FIELD**

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**[Industrial Application] This invention relates solid liquid separation to a dipping former filter in a tub.**

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**PRIOR ART**

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[0003] On the other hand, solid liquid separation of the mixed liquor 3 in a reaction vessel 1 is carried out with the membrane-separation unit 8, and the transparency liquid which penetrated the filtration membrane of the membrane-separation unit 8 is taken out to the treated water tub 12 through the siphon 11 with a suction pump 10 as treated water 9.

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**EFFECT OF THE INVENTION**

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## **TECHNICAL PROBLEM**

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**MEANS**

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## **OPERATION**

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## EXAMPLE

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[0017] Hereafter, the operation in the above-mentioned configuration is explained. The end reservoir of the raw water supplied from the raw water supply pipe 35 in the flow control tub 32 is carried out, and the membrane-separation tub 21 is supplied through the circulation tubing 37 with a circulating pump 36. returning surplus processed water 22 to the flow control tub 32 through an overflow pipe 33 in the membrane-separation tub 21 -- catchment opening 33a of an overflow pipe 33 -- an upper limit -- carrying out -- processed water 22 -- storing -- the water level in the membrane-separation tub 21 -- the location of catchment opening 33a -- setting out -- it always maintains as water level.

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and aeration is carried out towards the upper part from the powder trachea 29. The processed water 22 in the membrane-separation tub 21 is stirred, and it is made to circulate within a tub by the lifting stirring style which occurs according to this airlift operation of air that carried out aeration.

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[0021] Solid content, such as excess sludge which remains to the membrane-separation tub 21, operates the closing motion valve 27, and discharges it out of a tub through the sludge drawn tube 28.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

**[Drawing 1]** It is the whole dipping former filter block diagram in one example of this invention.

**[Drawing 2]** It is the conventional dipping former filter whole block diagram.

**[Description of Notations]**

**21 Membrane-Separation Tub**

**23 Membrane-Separation Unit**

**24 Fetch Tubing**

**24a Flow control valve**

**32 Flow Control Tub**

**33 Overflow Pipe**

**33a Catchment opening**

**36 Circulating Pump**

**37 Circulation Tubing**

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**[Translation done.]**

## \* NOTICES \*

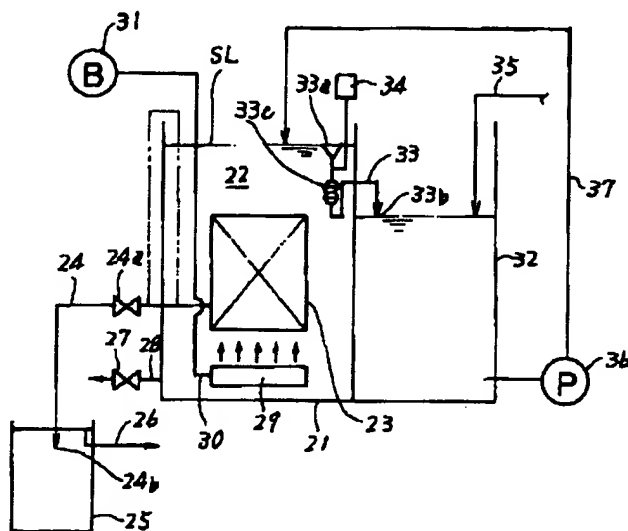
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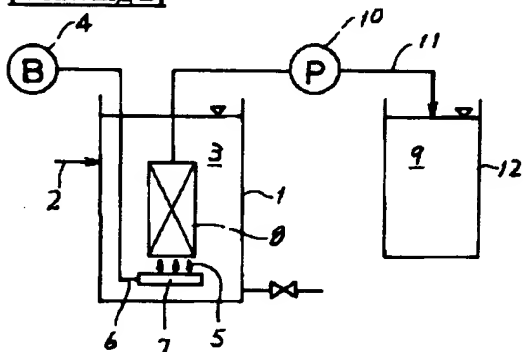
## DRAWINGS

[Drawing 1]

- 21 ---- 膜分離槽
- 23 ---- 膜分離ユニット
- 24 ---- 取出管
- 24a ---- 流量調整弁
- 32 ---- 流量調整槽
- 33 ---- オーバーフロー管
- 33a ---- 集水口
- 36 ---- 循環ポンプ
- 37 ---- 循環管



[Drawing 2]



[Translation done.]



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(12)公開特許公報(A)

(11)特許出願公開番号

特開平6-218237

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63/06		8014-4D		
C 0 2 F 1/44	Z A B K	8014-4D		

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(22)出願日 平成5年(1993)1月25日

(71)出願人 000001052

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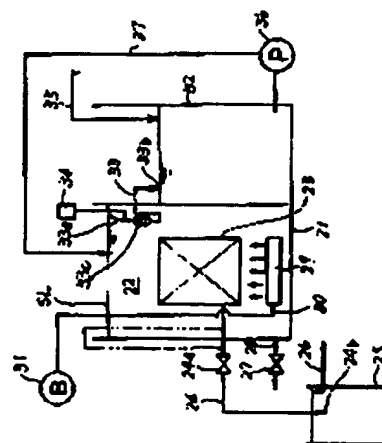
(74)代理人 弁理士 森本 義弘

(54)【発明の名称】 浸漬型濾過装置

(57)【要約】

【構成】 膜分離槽21内に膜分離ユニット23を適当水深下に浸漬配置する。排水口33aが膜分離ユニット23より上方の適当位置に開口するオーバーフロー管33を設ける。基端側が膜分離ユニット23の透過液流路に連通するとともに、先端側が膜分離槽21の外部において膜分離ユニット23より下方位置に開口する取出管24を設ける。

【効果】 膜分離ユニット23に設定水位からの水深に相応する水頭圧を作用させることにより、別途に動力を加えることなく被処理水の固液分離を行うことができ、ランニングコストの低減を図ることができる。



21 ..... 膜分離槽  
22 ..... 膜分離ユニット  
23 ..... 膜分離ユニット  
24 ..... 取出管  
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## 【特許請求の範囲】

【請求項1】 被処理水が流入する膜分離槽内に膜分離ユニットを適当水深下に浸漬配置し、集水口が膜分離ユニットより上方の適当位置に開口するオーバーフロー管を設け、基端側が膜分離ユニットの透過液流路に連通するとともに、先端側が膜分離槽の外部において膜分離槽液面より下方向位置に開口する取出管を設けたことを特徴とする浸漬型透過装置。

【請求項2】 オーバーフロー管の集水口を上下に昇降自在に設けたことを特徴とする請求項1記載の浸漬型透過装置。

【請求項3】 取出管の先端側に流量調整弁を設けたことを特徴とする請求項1記載の浸漬型透過装置。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、槽内において固液分離を浸漬型透過装置に関する。

【0002】

【従来の技術】従来、水処理において透過装置を用いる構成としては、例えば図2に示すようなものがある。図2において、反応槽1には原水供給管2を通して下水、し尿等の原水が流入し、原水は反応槽1内の活性汚泥と混合して混合液3を形成する。また、ブローア4により空気5を送気管6を通して散気装置7に供給し、散気装置7から上方に向けて空気5を噴気する。この噴気によって混合液3中に酸素を供給するとともに、空気5のエアリフト作用により生じると上昇縦井流によって反応槽1内の混合液3を攪拌混合しながら槽内で循環させる。

【0003】一方、膜分離ユニット8によって反応槽1内の混合液3を固液分離し、膜分離ユニット8の透過膜を透過した透過液は処理水9として吸引ポンプ10により吸引管11を通して処理水槽12に取り出す。

【0004】

【発明が解決しようとする課題】しかし、上記した従来の構成において、反応槽1内の混合液3を固液分離するためには、吸引ポンプ10によって膜分離ユニット8に負圧を与える必要がある。この負圧は膜分離ユニット8における透過流束（Fluxフラックス）に応じて制御するものであるが、膜面にケーキ層が形成されると透過流束が低下するので、負圧を高める必要があり、吸引ポンプ10の駆動に伴うランニングコストが高くなる問題があった。

【0005】本発明は上記課題を解決するもので、吸引ポンプを用いることなく、かつ別途に動力を必要とすることなく槽内の被処理水を固液分離することができる浸漬型透過装置を提供することを目的とする。

【0006】

【課題を解決するための手段】上記課題を解決するために、本発明の浸漬型透過装置は、被処理水が流入する膜分離槽内に膜分離ユニットを適当水深下に浸漬配置し、

集水口が膜分離ユニットより上方の適当位置に開口するオーバーフロー管を設け、基端側が膜分離ユニットの透過液流路に連通するとともに、先端側が膜分離槽の外部において膜分離槽液面より下方向位置に開口する取出管を設けた構成としたものである。

【0007】また、オーバーフロー管の集水口を上下に昇降自在に設けた構成としたものである。また、取出管の先端側に流量調整弁を設けた構成としたものである。

【0008】

【作用】上記した構成により、オーバーフロー管の集水口を上限として膜分離槽内に被処理水を貯留し、膜分離槽内の水位を集水口の位置を設定水位として維持する。この状態において、膜分離ユニットには設定水位からの水深に相応して水頭圧が作用するので、水頭圧を膜分離ユニットの駆動圧力として膜分離槽内の被処理水を固液分離し、膜分離ユニットの透過膜を透過した透過液は取出管を通して膜分離槽の外部に取り出す。したがって、別途に外部から動力を加えることなく被処理水の固液分離を行うことができる。

【0009】また、集水口を昇降することにより膜分離槽内の設定水位を変位させ、膜分離ユニットに加える水頭圧を調整して、膜分離ユニットにおける透過流束を制御する。

【0010】また、流量調整弁を設けることにより膜分離ユニット内に与える背圧を調整し、膜分離ユニットにおける透過流束を制御する。

【0011】

【実施例】以下、本発明を水処理に適用した一実施例を図面に基づいて説明するが、本発明は水処理に限られるものではなく、触媒や吸着剤の固液分離にも適用可能である。

【0012】図1において、膜分離槽21の内部には、被処理水22として下水やし尿等の原水と活性汚泥との混合液を貯留しており、被処理水22の適当水深下に膜分離ユニット23を浸漬配置している。この膜分離ユニット23は板状をなす複数の膜モジュールを適当間隔において上下方向に平行に配置したものであり、各膜モジュールの透過液流路に連通して取出管24を設けている。

【0013】この取出管24は、基端側で膜分離ユニット23の透過液流路に連通するとともに、先端側で流量調整弁24aを介して膜分離槽21の外部に連通しており、その先端開口24bは膜分離槽液面SLより下方に位置している。また、取出管24の先端開口24bは処理水貯留槽25内に位置しており、処理水貯留槽25にはその水位を一定に維持する溢流管26を設けている。尚、取出管24は図1中に二点鎖線で示すようにサイホン式に形成することも可能である。

【0014】膜分離槽21の底部には開閉弁27を介した汚泥引抜き管28が開口するとともに、膜分離ユニッ

ト23の下方に位置して散気管29を配置しており、散気管29には送気管30を介してブローア31を接続している。尚、散気管29に代えて機械的な攪拌翼を持った攪拌装置を設置することも可能である。

【0015】膜分離槽21は隣接する流量調整槽32にオーバーフロー管33を介して連通しており、オーバーフロー管33は集水口33aが膜分離槽21内の膜分離ユニット23より上方の適当位置に開口し、排出口33bが流量調整槽32内に開口している。また、オーバーフロー管33の途中には蛇腹部33cを上下方向に伸縮自在に設けており、集水口33aは上下に出退するシリンダ装置34が保持している。尚、オーバーフロー管33はゴムホース等の可撓性を有する部材で形成することも可能である。

【0016】流量調整槽32には上部に原水供給管35が開口し、底部に循環ポンプ36を介装した循環管37が開口しており、循環管37は先端側が膜分離槽21内で開口している。

【0017】以下、上記構成における作用を説明する。流量調整槽32において原水供給管35から供給する原水を一過貯留し、循環ポンプ36により循環管37を通して膜分離槽21に供給する。膜分離槽21においては、余剰な被処理水22をオーバーフロー管33を通して流量調整槽32に戻すことにより、オーバーフロー管33の集水口33aを上限として被処理水22を貯留し、膜分離槽21内の水位を集水口33aの位置を設定水位として常に維持する。

【0018】一方、ブローア31により送気管30を通して散気管29に空気を供給し、散気管29から上方に向けて曝気する。この曝気した空気のエアリフト作用により生じる上昇攪拌流によって、膜分離槽21内の被処理水22を攪拌し、かつ槽内で循環させる。

【0019】この状態において、膜分離ユニット23には設定水位SLと取出管先端開口24bとの差に相当する水頭圧が作用するので、水頭圧を膜分離ユニット23の駆動圧力として膜分離槽21内の被処理水22を固液分離する。膜分離ユニット23の透過膜を透過した透過液は取出管24を通して膜分離槽21の外部に取り出し、処理水貯留槽25に貯留する。また、膜分離ユニッ

ト23の膜面に付着するケーキ層は上述の上昇攪拌流によって膜面から剥離させ、再び槽内で循環させる。

【0020】そして、膜分離ユニット23における透過流量を調整する場合（初期設定時や駆動圧力の不足時等）には、シリンダ装置34によって集水口33aを昇降させることにより、膜分離槽21内の設定水位SLを変動させ、膜分離ユニット23に加える水頭圧を制御する。あるいは、取出管24に介装した流量調整弁24aを操作することにより、膜分離ユニット23内を与える背圧を調整し、膜分離ユニット23における透過流量を制御する。

【0021】膜分離槽21に残留する余剰汚泥等の固形分は開閉弁27を操作して汚泥引抜管28を通して槽外に排出する。

【0022】

【発明の効果】以上述べたように本発明によれば、膜分離槽内の被処理水を設定水位に維持して、膜分離ユニットに設定水位からの水深に相応する水頭圧を作用させることにより、外部から別途に動力を加えることなく被処理水の固液分離を行うことができ、膜分離操作にかかるランニングコストの低減を図ることができる。また、集水口の昇降により水頭圧を調整するか、流量調整弁の操作により膜分離ユニット内を与える背圧を調整することによって、膜分離ユニットにおける透過流量を制御することができる。

【図面の簡単な説明】

【図1】本発明の一実施例における浸漬型透過装置の全体構成図である。

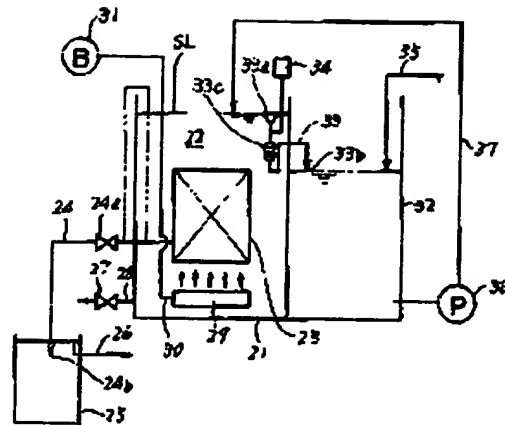
【図2】従来の浸漬型透過装置の全体構成図である。

【符号の説明】

21	膜分離槽
23	膜分離ユニット
24	取出管
24a	流量調整弁
32	流量調整槽
33	オーバーフロー管
33a	集水口
36	循環ポンプ
37	循環管

【図1】

- 21 ---- 膜分離槽  
 26 ---- 膜分離ユニット  
 24 ---- 吐出管  
 24a ---- 気液分離弁  
 32 ---- 気液分離槽  
 33 ---- オーバーフロー管  
 33a ---- 排水口  
 36 ---- 循環ポンプ  
 37 ---- 送液管



【図2】

